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(54) Title: LIQUID DESICCANT DEHUMIDIFIER AND AIR CONDITIONER

(57) Abstract

The present invention provides a liquid desiccant dehumidifier and a liquid desiccant air conditioner including an absorption air conditioner and a liquid desiccant dehumidifier. The dehumidifier includes a liquid desiccant absorber for absorbing moisture contained in ambient air entering the dehumidifier and passing through the desiccant absorber. A boiler is provided for boiling partially preheated dilute liquid desiccant to evaporate moisture to reconstitute the liquid desiccant into concentrated liquid desiccant. In a preferred embodiment, a first heat exchanger fluidly communicates with the desiccant absorber and a second heat exchanger. The first heat exchanger is operable to transfer heat from the concentrated liquid desiccant to the dilute liquid desiccant directed to the first heat exchanger from the desiccant absorber to raise the temperature of the dilute liquid desiccant to a first temperature. A condenser fluidly communicates with the boiler to receive steam generated by boiling the liquid desiccant in the boiler, and with the first heat exchanger to receive partially heated dilute liquid desiccant from the first heat exchanger at the first temperature. The condenser is operable to sensibly heat the dilute liquid desiccant therein to a second temperature by recovering the latent heat of condensation as steam delivered from the boiler is condensed. The second heat exchanger fluidly communicates with the condenser, the boiler and the first heat exchanger. The second heat exchanger is operable to transfer heat from concentrated liquid desiccant directed to the second heat exchanger from the boiler to the dilute liquid desiccant directed to the second heat exchanger from the condenser at the second temperature to raise the temperature of the dilute liquid desiccant to a third temperature. The dilute liquid desiccant at the third temperature is directed to the boiler and the concentrated liquid desiccant from the second heat exchanger is directed to the first heat exchanger. The second heat exchanger is disposed with respect to the boiler to recover waste heat from the boiler. A pump is provided for pumping concentrated liquid desiccant into the absorber. A fraction of the steam from the boiler is used to regenerate the refrigerant in the absorption air conditioner.